oxidases and peroxidases; and the possible interrelations of enzymes and functional capacity. Chapters on the constitution and mode of action of enzymes present numerous newer aspects of study—the identity of rennin and proteolytic enzymes, their adsorption phenomena, the laws of enzyme action, and its reversibility, etc. A final chapter deals with some of the more obscure relations of enzymes to protoplasm and their environment.

Dr. Vernon distinguishes the intracellular enzymes from the exo-enzymes found in many secretions "by reason of the facts that they are bound up in the protoplasm of the cells, and, so long as these cells retain their vitality, can only exert their activity intracellularly." It is perhaps doubtful whether a rigid definition of this sort can be successfully defended. The author at any rate has extended his discussion in places beyond the bounds of strictly intracellular functions; and he has dispelled the fear that "the subject of these lectures might at first sight be regarded as too small and unimportant to warrant their reproduction in book form." They are entertaining as well as helpful. Incidentally, as a specimen of good book-making the volume is in striking contrast to the average American product.

LAFAYETTE B. MENDEL
SHEFFIELD SCIENTIFIC SCHOOL,
YALE UNIVERSITY

Plankton Investigations of the Danish Lakes. By C. WESENBERG-LUND. Copenhagen, 1908. Pp. xii + 389. Appendix with forty-six tables.

This is the second volume from the pen of Dr. Wesenberg-Lund dealing with the investigations that have been made at the Danish Freshwater Laboratory. In the first volume, published in 1904, the plankton is treated chiefly from the qualitative and quantitative standpoints. In the present one the origin and variation of the Baltic fresh-water plankton forms are discussed. The variations have been studied by statistical methods in a large amount of material that was collected during a period of ten years.

The author attributes seasonal variations to the increase in the temperature of the water in the spring which lowers its specific gravity and viscosity, thus increasing the rate of sinking of plankton organisms. In response to this change, the organisms increase their buoyancy by adaptations which tend to prevent accelerated sinking. The rate of sinking of an organism depends upon its over-weight, that is, how much heavier it is than the water, its form and relative superficial area, and the viscosity of the water. The first two, over-weight and form-resistance, are the biological factors involved and are conditioned by the organism itself. Buoyancy may be increased by reducing the over-weight, or by increasing the form-resistance. The latter may be increased by enlarging the relative surface through a decrease in volume, by enlarging the absolute surface through an increase in the longitudinal axis or the formation of processes, or by gelatinous coverings. Such adaptations constitute seasonal variations and these are discussed in Chapters II. to XI.

Among the diatoms, it was found that *Tabellaria* and *Asterionella* form chains in the spring but they become stellate in summer. There are variations in the size of the cell, also, which are not seasonal but which seem to have a cycle of four to five years.

In *Ceratium hirundinella* the individuals are comparatively small in April and early May and at this time a fourth horn may be entirely absent or only feebly developed. In late May and in June there is a very considerable increase in size (100μ in length in a month) and a fourth horn suddenly develops. In the latter part of July and in August, the individuals decrease in size and the fourth horn nearly or entirely disappears.

Definite seasonal variations were found in only two rotifers, *Anurœa cochlearis* and *Asplanchna*. The variations begin in May and June and the individuals differ most from the typical, or winter form, when the water reaches its highest temperature. Late in the autumn they return again to their normal appearance.

Dr. Wesenberg-Lund thinks there is ample justification for the reduction of the pond and

the various lake forms of the long-spined Daphniæ to one species, viz., *Daphnia longispina*. The winter forms of *Daphnia hyalina, Hyalodaphnia (Daphnia) cucullata* and *Cephaloxus* can not be distinguished from each other and they remain indistinguishable in the spring till the water reaches a temperature of 14° to 16° C. As the temperature rises above this, these indistinguishable forms change in the course of two or three weeks into the slenderer and lighter summer forms which show all the characteristics of the different races to which they belong. In the autumn all return again to the common race form which is found from December until April. The autumn change extends over a longer period than the spring change.

Bosmina coregoni shows a decided seasonal variation while *B. longirostris* shows only an extremely slight one.

The author reaches the conclusion that local and seasonal variations arose during the glacial epoch and are to be considered as the reply of the organism to the greater differentiation in environment; in part at least to the greater claims made by the rising temperature on the floating power of the organism. The return to the arctic form in winter shows that seasonal variation is a condensed summary of the development which the organisms have undergone from the glacial period to the present time.

The long period of time covered by the collections used for this study, and the large amount of material that has been examined, make this a most valuable contribution to this phase of limnological investigations.

C. Juday

SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Biological Chemistry, Vol. VI., No. 4, August, 1909, issued August 12, 1909, contains the following: "The Spontaneous Oxidation of Cystin and the Action of Iron and Cyanides upon it: The Action of Metals and Strong Salt Solutions on the Spontaneous Oxidation of Cystein," by A. P. Mathews and Sydney Walker. In these two papers various influences which affect the spontaneous oxidation of cystin and cystein are described and the action explained in part. Analogies with cellular oxidations are pointed out. "On the Nature of the Chemical Mechanism which Maintains the Neutrality of Tissues and Tissue-fluids," by T. Brailsford Robertson. The maintenance of neutrality in the blood plasma and tissues is largely dependent upon proteins. The reactions by which it is brought about are explained. "Observations on Uricolysis, with Particular Reference to the Pathogenesis of 'Uric Acid Infarcts' in the Kidney of the New-born," by H. Gideon Wells and Harry J. Corper. Uricolytic ferments could not be demonstrated in human tissues: uric acid deposits in kidneys are not therefore due to failure of such enzymes. "Protein Metabolism in Cystinuria, II.," by Horatio B. Williams and Charles G. L. Wolff. Various metabolic tests carried out on a patient with cystinuria. "The Direct Colorimetric Determination of Phosphorus with Uranium Acetate and Potassium Ferrocyanide," by Robert B. Gibson and Clarence Estes. A convenient quantitative method for total phosphorus in organic compounds. "Notes on the Effect of Shaking upon the Activity of Ptyalin," by Marie M. Harlow and Percy G. Stiles. Adsorption is a factor in explaining the curious observation that some enzymes may be destroyed by mechanical shaking. "The Estimation of Total Sulphur in Urine," by Stanley R. Benedict. Oxidation by copper nitrate very greatly facilitates the estimation of total sulphur.

SPECIAL ARTICLES

SALIENT EVENTS IN THE GEOLOGIC HISTORY OF CALIFORNIA

There are few regions in the world where the records of geologic history are more complete than in California, for every major division is represented by marine sediments, and many of them also by continental deposits. This is made possible by the geographic position between two ancient and persistent bodies of water, the Pacific Ocean, and the Great Basin Sea, which alternately encroached on what is now California, each one supplying that part of the record which the other